What is Claimed:

1. A method for synchronizing a receiver to a transmitter comprising the following steps:

receiving a digital signal from the receiver;

delaying the digital signal by a sample processing interval to produce a delayed signal; and

correlating the digital signal and delayed signal to create a correlator output.

2. The method of claim 1 further comprising the additional steps of:

determining a magnitude of the correlator output; and

comparing the magnitude of the correlator output to a preset threshold value wherein when the magnitude exceeds the preset threshold value an incoming packet is detected at the receiver.

3. The method of claim 1 further comprising the additional steps of:

determining a magnitude of the correlator output;

monitoring time samples during which the magnitude of the correlator output exceeds a preset threshold value;

determining a sample point at which the magnitude of the correlator output is maximum;

back-biasing by at least one time sample.

4. The method of claim 1 further comprising the additional steps of:

determining a phase shift of the correlator output corresponding to a maximum value of the correlator output wherein the phase shift is an estimate of the fractional portion of carrier frequency offset.

5. A method for synchronizing a receiver to a transmitter comprising the following steps:

receiving a digital signal from the receiver;

demodulating long sync symbols from the digital signal; and

correcting for a fractional portion of frequency offset.

6. The method of claim 5 wherein the step of demodulating the long sync symbols is performed using a fast Fourier transform (FFT) processor in the receiver.

7. The method of claim 5 comprising the additional step of combining modulation values from two long sync symbols.

8. The method of claim 5 comprising the additional step of extracting vectors of modulation values of data sub-carriers with progressive trial integer offsets.

9. The method of claim 8 comprising the additional step of dividing each vector by long sync symbol modulation values to obtain channel transfer functions.

10. The method of claim 9 comprising the additional step of estimating odd frequency values for each of the channel transfer functions.

11. The method of claim 10 wherein the step of estimating odd frequency values is performed using an interpolation algorithm.

12. The method of claim 9 comprising the additional steps of:

correlating the interpolated odd frequency values of the channel transfer function and the actual odd frequency values; and

selecting a correlation value to identify an integer frequency offset number.

13. The method of claim 9 comprising the additional steps of:

correlating the interpolated odd frequency values of the channel transfer function and the actual odd frequency values to create a correlation value;

computing a magnitude of the correlation value; and

selecting the largest magnitude of the correlation value to identify an integer frequency offset number.

14. The method of claim 13 comprising the additional steps of:

associating the largest magnitude of the correlation value with a channel transfer function;

using the channel transfer function to correct data symbols for amplitude and phase shifts.

15. A method for synchronizing a receiver to a transmitter comprising the following steps:

receiving a digital signal from the receiver;

delaying the digital signal by a sample processing interval to produce a delayed signal;

correlating the digital signal and delayed signal to create a correlator output;

determining a phase shift of the correlator output corresponding to a maximum value of the correlator output wherein the phase shift is an estimate of the fractional portion of carrier frequency offset;

extracting long sync symbols from the digital signal;

correcting for a fractional portion of frequency offset;

extracting vectors of modulation values of data sub-carriers with progressive trial integer offsets;

dividing each vector by long sync symbol modulation values to obtain channel transfer functions;

estimating odd frequency values for each of the channel transfer functions;

correlating the interpolated odd frequency values of the channel transfer function and the actual odd frequency values; and

selecting a correlation value to identify an integer frequency offset number.

16. A method for deriving frequency offset correction and sample timing information for symbol number m+1 based on pilot tone information contained in symbol m of a sequence of N data symbols comprising the following steps:

extracting Fourier coefficients of the m^{th} symbol by way of a fast Fourier transform of the receiver;

dividing the Fourier coefficients by a channel response function to correct for amplitude variations and phase shifts during transmission and for phase shifts;

extracting phase shift offsets of pilot tones relative to known phase shifts for the m^{th} symbol;

approximating a straight line of the phase shifts versus frequency;

computing a frequency offset error based on the values of the phase shifts;

combining the frequency offset error with frequency offsets computed for the m^{th} symbol, creating the value of frequency offset to be used for the m+1 symbol; and

combining the slope of the straight line with the phase slope used in the channel response of the m^{th} symbol to create the phase slope of a channel response for the $m+1^{st}$ symbol.

17. The method of claim 16 wherein the step of approximating a straight line of the phase shifts versus frequency is done using a least squares fit approximation.

18. A system for synchronizing digital signal at a receiver from a transmitter comprising:

means for delaying the digital signal by a sample processing interval to produce a delayed signal; and

a correlator for correlating the digital signal and delayed signal to create a correlator output.

19. The system of claim 18 further comprising:

an integrator for determining a magnitude of the correlator output; and

a comparator means for comparing the magnitude of the correlator output to a preset threshold value wherein when the magnitude exceeds the preset threshold value an incoming packet is detected at the receiver.

20. The system of claim 18 further comprising:

an integrator for determining a magnitude of the correlator output;

a means for monitoring samples during which the magnitude of the correlator output exceeds a preset threshold value;

a magnitude detector for determining a sample point at which the magnitude of the correlator output is maximum;

a delay means for back-biasing the received signal by at least one time sample.

21. The system of claim 18 further comprising:

a phase shift detector means for determining the phase shift of the correlator output corresponding to a maximum value of the correlator output wherein the phase shift is an estimate of the fractional portion of carrier frequency offset.